in other striated muscle, and that its excessive tenuity is probably the cause of its escaping observation.

XVI. "Researches on the Structure, Physiology, and Development of *Antedon* (*Comatula,* Lamk.) *rosaceus*." By Dr. W. B. Carpenter, F.R.S. Received June 15, 1865.

(Abstract).

The author, after adverting to the special interest attaching to the study of this typical form, as the only one readily accessible for the elucidation of the life-history of the Crinoidea, states it to be his object to give as complete an account as his prolonged study of it enables him to offer, of its minute structure, living actions, and developmental history, taking up the last at the point to which it has been brought in the memoir of Prof. Wyville Thomson.

He prefaces his memoir with an historical summary of the progress of our knowledge of the distinctive peculiarities of this genus, and of its relation to the Crinoidea; and he shows that the first recognition of this relationship was most distinctly made by Llhuyd, at the beginning of the last century, though that recognition has been passed without notice by most subsequent writers, and is altogether ignored by MM. de Koninck and le Hon in their recent history.

The author then proceeds to describe the external characters of *Antedon rosaceus*; and shows, from its habits as observed in a vivarium, that although possessed of locomotive power, it makes so little use of this under ordinary circumstances, that its life in the adult condition, no less than in its earlier stage, is essentially that of a pedunculate Crinoid.

He then gives a minute description of the several pieces of the skeleton—the accounts of these previously given by J. S. Miller and Prof. Joh. Müller not being in sufficient detail to serve as standards of comparison to which the parts of fossil Crinoids may be referred. And he directs special attention to the curiously inflected rosette-like plate, previously unnoticed, which occupies the central space left within the annulus formed by the adhesion of the first radials. This plate is in special relation to the organ termed by Joh. Müller the "heart," but certainly having no proper claim to that designation, being a quinquepartite cavity in the central axis, from the walls of which there pass out not vessels but solid cords of sarcode, into the rays and arms, and also into the dorsal cirri. The inflexions of the rosette-like plate serve for the support and protection of the large cords passing into the rays, each of which has a double origin, and a connexion with the adjacent radiating cords that reminds the anatomist of the "circle of Willis."

The skeleton of the adult differs so widely in the forms and relations of its parts from that of the early Pentacrinoid larva described by Prof. Wyville Thomson, that the derivation of the former from the latter can only be understood by observation of all the intermediate stages. When

The Royal Society is collaborating with JSTOR to digitize, preserve, and extend access to *Proceedings of the Royal Society of London.* www.jstor.org

the calcareous skeleton of the calyx first shows itself, it consists only of five *oral* plates arranged conformably upon five *basal* plates, as thus:—

O O O O O
B B B B B

At a stage a little more advanced (which has been described by Prof. Allman, Trans. Roy. Soc. Ed. vol. xxiii. p. 241), the rudiments of the *first radials* are found interposed between the orals and basals, alternating in position with both, as in the margin; and between two of these first radials there appears a single small unsymmetrical plate, which afterwards proves to be the *anal*. The first radials undergo a rapid increase in size, and soon become surmounted by *second* and *third* radials, which project between the orals; whilst the orals and basals, undergoing no such increase, are relatively very much smaller; the *anal* plate is still found on the line of the first radials. But from this time the radials form the principal part of the calyx, which opens out widely in conformity with the increase of space required for the digestive apparatus, the intestinal canal being now developed around what was originally a simple stomach with one orifice. The highest joint of the stem also undergoes a remarkable increase in size, and begins to acquire the form of a basin with an inflected rim, constituting what is known in the adult as the *centro-dorsal* piece. When the calyx opens out, the five *oral* plates which originally formed a circlet around the mouth, retain that position, and detach themselves entirely from the divergent radials, nothing but the soft perisomatic membrane filling up the space between them. These *oral* plates never increase in size, and towards the end of the Pentacrinoid stage they begin to undergo absorption. I can still trace their basal portions in young specimens of the free *Antedon*; but as the creature advances towards maturity they are altogether lost sight of. When the intestinal canal has been sufficiently developed to open on the surface of the oral disk, the *anal* plate is lifted out of the position it originally occupied, and is at last found on the anal funnel, far removed from the radials. This, like the oral plates, begins to undergo absorption towards the end of the crinoidal stage, and completely disappears in the early part of the life of the free Antedon. The *radial* plates increase not only in size but also in thickness; and channels which are left on their internal surface by vacuities in the calcareous network, are converted into canals by a further inward growth of this, which completely covers them in. It is through these canals that the cords of sarcode pass to the arms. The *basal* plates, like the oral, remain stationary in point of size, and present no change in appearance or position until after they have been completely concealed externally by the centro-dorsal piece (the highest joint of

a a a a a
B B B B B

A^3 A^3 A^3 A^3 A^3
A^2 A^2 A^2 A^2 A^2
O O O O O
A^1 A^1 an A^1 A^1 A^1
B $\overline{B}$ B B B

the stem), which rapidly augments, both in absolute and in proportional size, when the development of the dorsal cirri is taking place from its convex surface. By the end of the Pentacrinoid stage, this plate has extended itself so far over the base of the calyx as completely to conceal the basals; and as the free Antedon advances towards maturity, it gradually extends itself over the first radials, which then become adherent to it and to each other. The basals then undergo a most curious metamorphosis, consisting in absorption in one part and extension in another, by which they finally become converted into five peculiarly shaped pieces, the ultimate union of which forms the single rosette-like plate, which has been already stated to lie within the annulus formed by the first radials of the adult *Antedon*. Hence the calyx finally comes to be thus composed:—

$$\begin{array}{ccccccccccc} R^3 & & R^3 & & R^3 & & R^3 & & R^3 & \\ R^2 & & R^2 & & R^2 & & R^2 & & R^2 & \\ \overbrace{} & & \overbrace{} & & \overbrace{} & & \overbrace{} & & & \\ b & R^1 & b & R^1 & b & R^1 & b & R^1 & b & R^1 \\ \underbrace{} & & & & & & & & & \end{array}$$

CENTRO-DORSAL.

As the *orals* and the *anal* have entirely disappeared, no part of the primordial calyx of the Pentacrinoid larva is traceable in it, until we separate the adherent pieces which form its base, and search out the minute and delicate rosette-like plate which is formed by the metamorphosis of the *basals*.

The structure, physiology, and development of the digestive, circulatory, and respiratory apparatus, and of the nervous and muscular systems, will form the subject of a future memoir.

XVII. "On the Chameleon's Retina; a further contribution to the Minute Anatomy of the Retina of Amphibia and Reptiles." By J. W. HULKE, Esq. Communicated by WILLIAM BOWMAN, Esq.

(Abstract.)

The Chameleon's retina is peculiar in having a fovea and pecten, and in the nervous conducting fibres crossing the connective-tissue fibres instead of running parallel to them. The fovea was discovered by Knox in 1823, and minutely described by H. Müller, who also discovered the singular arrangement of the two sets of fibres in 1862. It is a circular pit situated at the posterior pole of the eyeball. A dark brown dot, surrounded by a lighter areola, marks its centre. Here the bacillary layer, which contains cones only, is alone present. The cones of the fovea are long, slender cylinders placed vertically upon the choroid. From the centre of the fovea outwards, the cones become stouter, shorter, and more numerous towards the periphery of the retina,